

### **REMARKS**

This paper is responsive to the restriction requirement mailed January 23, 2008. Claims 1 and 72-144 are currently pending in this application and are subject to a restriction requirement. Claims 1 and 72-144 are amended to clarify what is claimed and to place the claims in better form for U.S. prosecution. Applicants submit that no new matter is added, as support for the amendments exists in the specification and claims as originally filed.

### **Response to Restriction Requirement**

#### **Election of Claims**

Restriction is required to one of the following three groups of claims under 35 U.S.C. §§ 121 and 372:

**Group I:** Claims 1, and 75-136, which according to the Examiner are drawn to a method of manufacturing a metal oxide, metal oxyhydroxide or metal hydroxide product. *See Office Action* at p. 2.

**Group II:** Claims 72-74, which according to the Examiner are drawn to an apparatus for manufacturing a metal oxide, metal oxyhydroxide, or metal hydroxide product. *See Office Action* at p. 2.

**Group III:** Claims 137-144, which according to the Examiner are drawn to a metal oxide, metal oxyhydroxide or metal hydroxide product. *See Office Action* at p. 2.

#### **Applicants elect with traverse Group I: claims 1 and 75-136.**

Applicants respectfully submit that the claims of Groups I and II share a common special technical feature under PCT Rule 13.2. Specifically, these claims recite solid reactor filling material upon which the product is produced, and this feature is not disclosed or suggested by

U.S. Patent No. 6,387,341 to Sarrade *et al.* ("Sarrade") Accordingly, Applicants respectfully request that the restriction between Groups I and II be withdrawn.

Election of Species

The Examiner has set forth the following species:

- i. the product is substantially crystalline (Claim 76)
- ii. the product is substantially amorphous (Claim 77)
- iii. the product is a mixture of several different phases (Claim 78)
- iv. the temperature is kept at a fixed temperature (Claim 82)
- v. the temperature is an increasing temperature (Claim 83)
- vi. the temperature is a decreasing temperature (Claim 84)
- vii. the temperature profile is an arbitrary combination (Claim 85)
- viii. the pressure is kept at a fixed pressure (Claim 87)
- ix. the pressure is an increasing pressure (Claim 88)
- x. the pressure is a decreasing pressure (Claim 89)
- xi. the pressure profile is an arbitrary combination (Claim 90)
- xii. the supercritical solvent is CO<sub>2</sub> (Claims 91 -92)
- xiii. the supercritical solvent is isopropanol (Claims 93-94)
- xiv. the supercritical solvent is brought into phase before introduction (Claim 95)
- xv. the supercritical solvent is brought into phase after introduction (Claim 96)
- xvi. introducing a plurality of different metal precursors into the reactor (Claim 100)
- xvii. metal precursor is metal alkoxide (Claims 101 -104)
- xviii. metal-containing precursor is a metal salt (Claims 105-107)

- xix. the solid reactor filling material comprises a polymer (Claims 11 7-1 19)
  - xx. the solid reactor filling material comprises a metal (Claims 120-121)
  - xxi. the solid reactor filling material comprises a metal oxide (Claims 122-123, 127)
  - xxii. the solid reactor filling material comprises a ceramic (Claim 124)
  - xxiii. the solid reactor filling material comprises a metal sulphate (Claim 125)
  - xxiv. the solid reactor filling material comprises a metal halide (Claim 126)
  - xxv. product is separable from the solid reactor filling material with no further treatments of the solid reactor filling material (Claim 130)
  - xxvi. product is separable from the solid reactor filling material without substantially degrading the solid reactor filling material (Claim 131)
  - xxvii. product is separable from the solid reactor filling material in a way that allows the solid reactor filling material to be re-used as solid reactor filling material (Claim 132)
  - xxviii. product is separable from the solid reactor filling material by flushing the solid reactor filling material in a fluid (Claim 133)
  - xxix. product is separable from the solid reactor filling material by vacuum means (Claim 134)
  - xxx. product is separable from the solid reactor filling material by blowing means (Claim 135)
  - xxxi. product is separable from the solid reactor filling material by ultrasonic means (Claim 136)
- See Office Action at 5-7.

**Applicants elect with traverse species iii. the product is a mixture of several different phases (Claim 78).** Applicants note that claim 78 is amended herein to recite “a mixture comprising at least two different phases.” Claim 78 reads on the elected species.

Applicants respectfully disagree with this species restriction requirement. As explained above, the Group I claims share the special technical feature that the resulting product is obtained on a solid reactor filling material. Sarrade, which is considered to be pertinent prior art by the Examiner, discloses a method of manufacturing metal oxides from organo-metallic precursors by bringing the precursors into contact with a reaction medium comprising supercritical CO<sub>2</sub> and an optional co-solvent. Nevertheless, Sarrade does not teach the presence of a solid reactor filling material.

As disclosed in the present specification, some objects of the instant invention include:

- a) reducing the energy budget for the production of metal oxide nanoparticles,
- b) producing very small metal oxide nanoparticles inexpensively, and/or
- c) producing metal oxide nanoparticles such that the particle size, crystal phase and degree of crystallinity can be controlled by external parameters. However, an objective technical problem to be solved underlying one or more of these objects includes efficiently collecting produced submicron primary particles.

In Sarrade, the product is separated by use of a cyclone separator. The working principle is that a pressure drop of the supercritical solvent causes a decrease in the solubility of the products and thereby a segregation. Such a pressure drop means that the segregation does not take place while the process runs continuously, which is one benefit of the invention as claimed. Thus, Sarrade does not suggest or teach a solution to the objective technical problem or a solid reactor filling material. Applicants respectfully submit that the claims are novel and non-obvious over Sarrade—a conclusion shared by the European Patent Office in the International Preliminary Examination Report—and respectfully submit that this species restriction should be withdrawn.

**Conclusion**

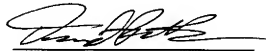
Applicants submit that all claims are in condition for allowance; notice to that effect is hereby solicited. Should any issues remain to be discussed in this application, the examiner is invited to contact the undersigned by telephone.

Respectfully submitted,

Hunton & Williams LLP

Dated: May 29, 2008

By:



Robin L. Teskin  
Registration No. 35,030

Dwight M. Benner, II  
Registration No. 52,467

HUNTON & WILLIAMS LLP  
Intellectual Property Department  
1900 K Street, N.W., Suite 1200  
Washington, D.C. 20006-1109  
Telephone: (202) 955-1500  
Facsimile: (202) 778-2201